

CLAIMS

WHAT IS CLAIMED IS:

1 1. A flexible marking catheter for placement in a
2 selected position in a body using a frameless stereotaxy
3 system, comprising:
4 a flexible catheter body made of a flexible material
5 and having a closed distal end and an open proximal end
6 and sized to removably fit on a frameless stereotaxy
7 system probe such that the catheter remains on the probe
8 as the catheter is positioned in a body using the probe
9 and such that the probe is removable from the catheter
10 without moving the catheter after the catheter is
11 positioned in the body using the probe.

1 2. The flexible marking catheter of Claim 1
2 wherein the catheter body is made of silicone rubber.

1 3. The flexible marking catheter of Claim 1
2 comprising additionally a flange at the open proximal end
3 of the flexible catheter body to facilitate removing the
4 probe from the catheter after the catheter is positioned
5 in the body using the probe.

1 4. The flexible marking catheter of Claim 1
2 comprising additionally length indicia visible on an
3 outer surface of the flexible catheter body indicating
4 distances along the catheter body from the distal end
5 thereof.

1 5. The flexible marking catheter of Claim 4
2 wherein the length indicia indicate centimeter distances
3 along the catheter body from the distal end thereof.

1 6. The flexible marking catheter of Claim 5
2 wherein the length indicia include rings visible around

3 an outer surface of the flexible catheter body at five
4 centimeters from the distal end thereof and at ten
5 centimeters from the distal end thereof and dots visible
6 on the outer surface of the flexible catheter body at
7 one, two, three, four, six, seven, eight, and nine
8 centimeters from the distal end thereof.

1 7. The flexible marking catheter of Claim 6
2 wherein the length indicia includes a double ring visible
3 around the outer surface of the flexible catheter body at
4 ten centimeters from the distal end thereof.

1 8. The flexible marking catheter of Claim 1
2 wherein the flexible catheter body is made of a brightly
3 colored material.

1 9. A flexible marking catheter for placement in a
2 selected position in a body using a frameless stereotaxy
3 system, comprising:

4 a flexible catheter body made of a flexible material
5 and having a closed distal end and an open proximal end
6 and sized to removably fit on a frameless stereotaxy
7 system probe such that the catheter remains on the probe
8 as the catheter is positioned in the body using the probe
9 and such that the probe is removable from the catheter
10 without moving the catheter after the catheter is
11 positioned in the body using the probe;

12 a flange at the open proximal end of the flexible
13 catheter body to facilitate removing the probe from the
14 catheter after the catheter is positioned in the body
15 using the probe; and

16 length indicia visible on an outer surface of the
17 flexible catheter body indicating distances along the
18 catheter body from the distal end thereof.

1 10. The flexible marking catheter of Claim 9
2 wherein the catheter body is made of silicone rubber.

1 11. The flexible marking catheter of Claim 9
2 wherein the length indicia indicate centimeter distances
3 along the catheter body from the distal end thereof.

1 12. The flexible marking catheter of Claim 11
2 wherein the length indicia include rings visible around
3 an outer surface of the flexible catheter body at five
4 centimeters from the distal end thereof and at ten
5 centimeters from the distal end thereof and dots visible
6 on the outer surface of the flexible catheter body at
7 one, two, three, four, six, seven, eight, and nine
8 centimeters from the distal end thereof.

1 13. The flexible marking catheter of Claim 12
2 wherein the length indicia includes a double ring visible
3 around the outer surface of the flexible catheter body at
4 ten centimeters from the distal end thereof.

1 14. The flexible marking catheter of Claim 9
2 wherein the flexible catheter body is made of a brightly
3 colored material.

1 15. A method of using a flexible marking catheter
2 for placement in a selected position in a body using a
3 frameless stereotaxy system, comprising:

4 providing a flexible marking catheter including a
5 flexible catheter body made of a flexible material and
6 having a closed distal end and an open proximal end and
7 sized to removably fit on a frameless stereotaxy system
8 probe;

9 mounting the flexible marking catheter on a
10 frameless stereotaxy system probe;

11 positioning the flexible marking catheter in the
12 selected position in the body using the frameless
13 stereotaxy system probe and a frameless stereotaxy system
14 to guide the positioning of the flexible marking catheter
15 in the body at the selected position; and
16 removing the frameless stereotaxy system probe from
17 the flexible marking catheter such that the flexible
18 marking catheter remains in the body at the selected
19 position therein after the frameless stereotaxy system
20 probe is removed from the flexible marking catheter.

1 16. The method of Claim 15 wherein the catheter
2 body is made of silicone rubber.

1 17. The method of Claim 15 wherein the flexible
2 marking catheter includes a flange at the open proximal
3 end of the flexible catheter body and wherein removing
4 the frameless stereotaxy system probe from the flexible
5 marking catheter includes holding the flexible marking
6 catheter in position by the flange while removing the
7 frameless stereotaxy system probe from the flexible
8 marking catheter.

1 18. The method of Claim 15 wherein the flexible
2 marking catheter includes length indicia visible on an
3 outer surface of the flexible catheter body indicating
4 distances along the catheter body from the distal end
5 thereof.

1 19. The method of Claim 18 wherein the length
2 indicia indicate centimeter distances along the catheter
3 body from the distal end thereof.

1 20. The method of Claim 19 wherein the length
2 indicia include rings visible around an outer surface of
3 the flexible catheter body at five centimeters from the

4 distal end thereof and at ten centimeters from the distal
5 end thereof and dots visible on the outer surface of the
6 flexible catheter body at one, two, three, four, six,
7 seven, eight, and nine centimeters from the distal end
8 thereof.

1 21. The method of Claim 20 wherein the length
2 indicia includes a double ring visible around the outer
3 surface of the flexible catheter body at ten centimeters
4 from the distal end thereof.

1 22. The method of Claim 15 wherein the flexible
2 catheter body is made of a brightly colored material.

1 23. A method of using a flexible marking catheter
2 for placement in a selected position in a body using a
3 frameless stereotaxy system, comprising:

4 (a) obtaining pre-operative images of a patient's
5 brain to determine the margins of a brain lesion;

6 (b) positioning the patient in a surgical field;

7 (c) registering the position of the patient in the
8 surgical field with the pre-operative images in a
9 frameless stereotaxy system;

10 (d) providing a flexible marking catheter including
11 a flexible catheter body made of a flexible material and
12 having a closed distal end and an open proximal end and
13 sized to removably fit on a frameless stereotaxy system
14 probe;

15 (e) mounting the flexible marking catheter on a
16 frameless stereotaxy system probe;

17 (f) positioning the flexible marking catheter in a
18 selected position in the patient's brain along a margin
19 of the brain lesion using the frameless stereotaxy system
20 probe and the frameless stereotaxy system to guide the
21 positioning of the flexible marking catheter along the

22 margin of the brain lesion based on the pre-operative
23 images;
24 (g) removing the frameless stereotaxy system probe
25 from the flexible marking catheter such that the flexible
26 marking catheter remains in the patient's brain at the
27 selected position therein after the frameless stereotaxy
28 system probe is removed from the flexible marking
29 catheter;
30 (h) cutting off the flexible marking catheter
31 remaining in the patient's brain near a surface of the
32 brain; and
33 (i) removing the brain lesion to expose the
34 flexible marking catheter.

1 24. The method of Claim 23 wherein the catheter
2 body is made of silicone rubber.

1 25. The method of Claim 23 wherein the flexible
2 marking catheter includes a flange at the open proximal
3 end of the flexible catheter body and wherein removing
4 the frameless stereotaxy system probe from the flexible
5 marking catheter includes holding the flexible marking
6 catheter in position by the flange while removing the
7 frameless stereotaxy system probe from the flexible
8 marking catheter.

1 26. The method of Claim 23 wherein the flexible
2 marking catheter includes length indicia visible on an
3 outer surface of the flexible catheter body indicating
4 distances along the catheter body from the distal end
5 thereof.

1 27. The method of Claim 26 wherein the length
2 indicia indicate centimeter distances along the catheter
3 body from the distal end thereof.

1 28. The method of Claim 27 wherein the length
2 indicia include rings visible around an outer surface of
3 the flexible catheter body at five centimeters from the
4 distal end thereof and at ten centimeters from the distal
5 end thereof and dots visible on the outer surface of the
6 flexible catheter body at one, two, three, four, six,
7 seven, eight, and nine centimeters from the distal end
8 thereof.

1 29. The method of Claim 28 wherein the length
2 indicia includes a double ring visible around the outer
3 surface of the flexible catheter body at ten centimeters
4 from the distal end thereof.

1 30. The method of Claim 23 wherein the flexible
2 catheter body is made of a brightly colored material.

1 31. The method of Claim 23 wherein obtaining pre-
2 operative images of a patient's brain includes obtaining
3 pre-operative images of a patients brain using a medical
4 imaging system selected from the group of medical imaging
5 systems consisting of magnetic resonance imaging systems
6 and computed tomography imaging systems.

1 32. The method of Claim 23 wherein positioning the
2 flexible marking catheter in a selected position in the
3 patient's brain along the margin of the brain lesion
4 includes positioning the flexible marking catheter in the
5 selected position in the patient's brain at a depth such
6 that the distal end of the positioned marking catheter is
7 positioned at a depth in the brain corresponding to a
8 depth of the brain lesion at the selected position.

1 33. The method of Claim 23 wherein steps (d) - (h)
2 are repeated such that a plurality of flexible marking
3 catheters are positioned in the patient's brain along the

4 margin of the brain lesion to define the margin of the
5 brain lesion and wherein removing the brain lesion
6 includes removing the brain lesion to expose all of the
7 plurality of flexible marking catheters thus positioned.